

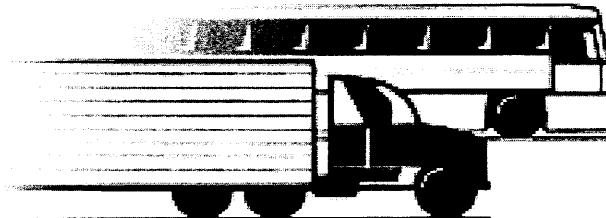
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F M C S A
Federal Motor Carrier Safety Administration

Commercial Vehicle Safety:
Strategic Issues and Potential Solutions

October 2000

Federal Motor Carrier Safety Administration
U.S. Department of Transportation

1. What can be done to enhance the safety performance of new entrant carriers?

Issue Statement

There has been a significant increase in the number of carriers registered with the U.S. Department of Transportation as interstate carriers. A series of studies beginning shortly after implementation of the Motor Carrier Act of 1980 have documented that new entrants have poorer safety performance and significantly less knowledge about and compliance with key safety regulations than do carriers who are more established. Previous research has documented the existence of a safety learning curve among new entrants such that observed safety and compliance problems diminish after a carrier has been involved in interstate operations for at least five years.

Strategic Importance

This issue represents a strategic one for the Federal Motor Carrier Safety Administration since there are a lot of new entrants registering with the DOT on a regular basis and the prospects are high that this influx will continue into the foreseeable future. In fact, the new carrier population has been growing by 35,000-45,000 per year or about 10 percent per year. Congress, the General Accounting Office, and the Federal Motor Carrier Safety Administration have recognized the significance of this issue. In fact, the Motor Carrier Safety Improvement Act (Section 210) mandated that a new entrant program be initiated.

Consequences if not Addressed

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There are significant consequences if policies and programs are not implemented to address the issue. Some of the previous empirical studies have documented crash rates for new entrants that are on the order of 15 to 20 percent higher than are the crash rates of established carriers. Some rough calculation based on the number of carriers involved and their mileage would yield estimates of crashes that could be avoided by eliminating or substantially reducing the safety learning curve of the new entrants. The set of potential solutions range from special monitoring and enforcement all the way to mandatory training/education combined with penalties based on performance deficiencies. However, there are significant resource implications for the FMCSA to implement an effective operational and enforcement oversight program for new entrants.

2. What can be done to improve the safety performance of small carriers?

Issue Statement

Of the nearly 500,000 motor carriers registered with the U.S. Department of Transportation (including for-hire and private carriers), 70 percent operate six or fewer trucks. There is empirical evidence documenting that carrier size is correlated with safety performance with poorer performance (as measured by driver performance, vehicle performance, and crash rates) associated with smaller carrier size. A recent analysis of compliance review (CR) results showed that on average carriers with a satisfactory rating had annual revenues of about \$37 million. In contrast, those with a conditional or unsatisfactory rating had average annual revenues of only \$10 million.

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Strategic Importance

This is a strategic issue for the Motor Carrier Safety Administration in view of the overwhelming number of small carriers in the population of carriers. However, reaching these smaller carriers with the current approaches to safety regulation employed by the agency is a challenging task. The sheer number of carriers involved combined with the often-limited geographic scope of their operations and limited exposure (i.e., small number of vehicle miles traveled) require significant resources in order to impact their performance in a meaningful way. Furthermore, it is also important to recognize that a conclusion about the relationship between size and carrier and safety performance relies on estimates of carrier size based on Motor Carrier Management Information Systems (MCMIS) data. While efforts have been made to update this information, especially in Performance Registration Information System (PRISM) states, there are important discrepancies due to the failure to update MCMIS carrier profile data on an ongoing basis.

Consequence if not Addressed

Nevertheless, a systematic safety performance difference based on carrier size is an important issue for the Federal Motor Carrier Safety Administration to consider. In order to determine the consequences of not addressing this issue would require an analysis to estimate the number of crashes that could be avoided if the smaller-sized carriers had crash rates that were comparable with larger size carriers. Clearly, the fact that the carriers with small fleets have a disproportionately small portion of total vehicle miles traveled and total crashes has an implication for the number of crashes that might be avoided through the initiation of a directed program at this issue. As in the case of new entrants, the set of potential solutions/actions for the FMCSA to adopt range from special monitoring of

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small carriers (with fleets fewer than six power units) to oversight of their regulatory knowledge, to mandatory training/education, and to penalties based on performance deficiencies. Initiated actions must be consistent with the Small Business Regulatory Enforcement Fairness Act (SBREFA) that provides small businesses with regulatory and enforcement fairness and protection.

3. What can be done to accelerate the pace of carrier investments in new technologies for vehicle diagnostics and prognostics?

Issue Statement

Technological developments now make it possible to have onboard, real-time diagnostic and maintenance support systems collecting information to assess the performance of as well as wear data on major components in order to facilitate timely maintenance activities. Furthermore, these technological developments present the data to the driver in a convenient and easily accessible manner in much the same way as an airline pilot keeps informed about the plane's major operating components. These developments have the opportunity to significantly reduce crashes in which mechanical failures play a significant contributing role to the cause of the incidents.

Strategic Importance

This is a strategic issue for the Federal Motor Carrier Safety Administration. First, the new technology by warning drivers in real time of impending mechanical problems, they have the opportunity to fix the problem before it becomes a direct factor contributing

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to the cause of a crash. Second, the existence of this technology to monitor the operating performance and wear data on major components would be a great asset to vehicle inspectors. It is clear that the current process of vehicle inspection would be enhanced through reliance on technology for assessing performance and wear information on major vehicle system components.

Consequence if not Addressed

It is anticipated that the discussed diagnostic and prognostic technologies for fleet maintenance will continue to increase rapidly, especially in new commercial motor vehicles. The question to address is whether the Federal Motor Carrier Safety Administration should initiate policy actions in order to facilitate the adoption of the new technologies as part of its safety monitoring function. There is some significant concern that institutional barriers exist that might limit the adoption of this new technology due to concerns about invasion of privacy and legal liability. However, the case for involvement of the FMCSA is based upon the belief that these new technologies have the potential to significantly reduce crashes involving vehicle defects as a contributing cause. Actions that could accelerate the pace of adoption range from standards development and testing; rapid technology prototyping; training and workshops; technical support all the way to direct tax incentives.

4. What can be done to accelerate carrier adoption of safety related technologies for their vehicles?

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There are on the horizon a number of safety related technologies that could become standard equipment on this nation's fleet of commercial tractor-trailers. In 1999, the American Trucking Associations' Foundation conducted a study for the Office of Motor Carrier Safety, Federal Highway Administration entitled "Motor Carrier Technologies: Fleet Operational Impact and Implications for Intelligent Transportation Systems/Commercial Vehicle Operations." These safety-related technologies range from traction control (available now) to automatic collision notification and intersection collision warning systems (to be available after 2005). The ATA study anticipated that these types of systems would be deployed relatively quickly at a pace of between 25,000 and 50,000 vehicles per year.

Beyond these technologies are ones involving lane change/merge warning, crash event recorders, and vehicle dynamics/stability warning. The ATA study anticipated that these types of technologies would be deployed after 2005 at a slower pace, i.e., between 5,000 and 25,000 vehicles per year. Finally, the ATA study predicted that the safety technologies to be deployed most slowly in fleets involve collision warning controls, road departure assistance, and driver condition warning. The ATA study put the post-2005 adoption rate for these technologies at between 1,000 and 5,000 vehicles per year.

Strategic Importance

This issue is a strategic one for the FMCSA. All the above safety related technologies have the potential to reduce crashes and/or mitigate their severity. While additional studies would be required to develop some specific estimates of the crashes that might be avoided, there is nevertheless strong logical evidence to estimate the potential impact as quite significant. However, these types of new technologies carry with them

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some significant institutional barriers to rapid deployment. These safety technologies have the potential to conflict with privacy and to create legal liability for the drivers/and or carriers that the carriers and drivers may not be willing to accept.

Consequence if not Addressed

The FMCSA has a significant challenge. The safety-related technologies are powerful and offer the prospect of enhancing motor carrier safety to a significant degree. However, the adoption of these new technologies to a significant degree will require the removal of institutional barriers. From the perspective of FMCSA, there are numerous opportunities for involvement. The range of activities that might be employed to facilitate adoption of these safety technologies is broad. Actions that could accelerate the pace of adoption range from standards development and testing; rapid technology prototyping; training and workshops; technical support all the way to direct tax incentives.

5. What can be done to accelerate diffusion of best practices in the training of commercial drivers?

Issue Statement

There are currently wide variations among carriers in the amount and type of training they provide to their commercial drivers. A study is underway at the University of Maryland to gather data from best carriers safety performers in each industry segment as a basis for defining a set of best safety training practices as well as other safety programs

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and policies. . Data on fatal crashes show a high representation from the pool of the most inexperienced drivers. While, it is recognized that a distribution of fatal crashes on the basis of the age of the truck driver does not control for exposure (i.e., the total vehicle miles driven by inexperienced drivers), there is enough reason to be concerned about the over-representation of inexperienced drivers.

Strategic Importance

The FMCSA has recognized driver training as a strategic issue. To improve professionalism among drivers, the FMCSA is developing driver-training standards for entry-level commercial vehicle drivers and multiple trailer combination vehicle (MTCV) drivers. A notice of proposed rulemaking outlining these standards will be completed this year. In addition, the FMCSA is working with Carnegie-Mellon Driver Training Safety Institute to implement a driver training facility under a TEA-21 grant.

Consequences if not Addressed

Driver training enhancements represent an important opportunity for tackling the crash occurrence/fatality issue. The current situation of driver shortages and strong demand for motor carrier services will exacerbate the problems associated with inexperienced drivers. Increasingly, carriers could be pressured to use drivers without the proper experience and training. These drivers based on existing evidence have a potentially greater risk than do more experienced drivers. Without intervention to improve training programs and practices, the adverse consequences of adding inexperienced drivers will increase. There are clearly a number of options available for consideration in achieving the objective of improved driver training. They range from

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publicizing the training programs and practices of the best safety performers to developing “model “ training programs and or facilities. There is also an option of mandating certain programs and procedures or, as an alternative, providing fiscal incentives for their adoption.

6. What can be done to improve the safety performance of the industry’s worst offenders?

Issue Statement

The Safety Status Measurement System (SafeStat) has facilitated the identification of the industry’s worst safety performers and focused attention on the nature of their deficiencies. By separating out overall safety performance into each of its major components (i.e., driver, vehicle, crash rate, and carrier programs and policies), SafeStat generates both an overall evaluation as well a drill down function providing for the identification of specific deficiencies. SafeStat demonstrates in a convincing way the magnitude of carrier deficiencies among the worst performances compared with best-in-class safety performance. By implication, overall carrier safety performance could be significantly enhanced if the safety performance of the worst carriers were brought closer to the standards set by the best ones. In fact, specific estimates of potential improvements in safety performance as measured by avoided crashes could be developed from the SafeStat data. The goal of SafeStat is to provide a tool for safety regulators to target their enforcement efforts at precisely those carriers whose safety behavior is most in need of modification. Throughout the development of the PRISM program, states have focused resources and strategies on the worst carriers and improving their safety performance.

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However, the average performance of the worst performers in the SafeStat database has not shown great improvement during the past five years.

Strategic Importance

Accelerating improvements in the safety performance of the worst carriers is an important strategic issue for the FMCSA. SafeStat evaluations of carriers have been conducted on a periodic basis for at least the past five years. However, there are carriers who throughout this period have seen virtually no improvement in their safety performance, especially in the area of crash rates. There is a clear challenge for the FMCSA to consider a set of actions and programs that will accelerate the safety improvement of carriers identified by SafeStat as the worst safety performers.

Consequence if not Addressed

There are consequences of failing to address the issue. There will be no possibility of achieving crash reduction goals if there is not improvement in the performance of the worst carriers. The challenge then is to develop a set of strategies and actions plans for carrier safety performance improvement. Some argue that making SafeStat results available on the Internet will provide the opportunity for insurance companies, shippers, and the safety community to employ the power of the marketplace to enforce safety improvements. Others feel strongly that some systematic phased program, mixing education, enforcement, monitoring, and sanctions would achieve best results. There are many different types of actions to consider, each with its own positive and negative aspects, which must be addressed prior to implementation.

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7. What can be done to address declining compensation/income levels of truck drivers?

Issue Statement

Deregulation, coupled with the move to “just-in-time” delivery systems and intense pressures for firms to streamline costs, has created downward pressure on truck driver compensation/income levels. Wage declines among drivers have been general and broad, according to Belzer, with the steepest declines among non-union truckload drivers.

These declines have been compounded by structural changes in the method of payment to the drivers. Drivers, in particular owner-operators, are generally paid on the basis of miles driven or on the basis of a portion of the total revenue generated. Loading and unloading have become problems in the current environment, according to Belzer, since drivers are required to load and unload for little or no pay. The University of Michigan driver survey shows that on average drivers spend 25 percent of their workweek on non-driving labor and, at the median receive no pay for it.

Strategic Importance

The rate of compensation/income/earnings of truck drivers is a strategic issue for the FMCSA. The declining incomes and increasing burdens associated with loading/unloading result in more demanding schedules for drivers, longer workweeks and hours of driving. Additionally, drivers have faced greater traffic congestion and delays in major metropolitan areas. These factors have added to their burden of unproductive work time.

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Consequences if not Addressed

There are important implications if the problem is not addressed. The longer workweeks and economic pressures have the strong potential of yielding increases in driver fatigue. Without some systematic policy to address these questions, the situation appears likely to continue, since the forces that are causing it to happen are entrenched and are advancing at an accelerated pace. The opportunities for intervention by the FMCSA are limited. Obviously, the FMCSA can't directly mandate wage increases. Previous Federal efforts to address the lack of payment for driver loading/unloading time have proved unsuccessful in the past. There may be opportunities for policy influence on the basis of including loading and unloading time in the basic calculation of work time to be lumped together with driving time, although this proposal will be controversial.

8. What are the most effective ways to facilitate collection and dissemination of real-time safety data?

Issue Statement

The FMCSA has invested significant resources over the past decade in centralizing and enhancing information about a carrier's safety performance in its Motor Carrier Management Information Systems (MCMIS). The MCMIS system centralized information regarding each carrier's roadside inspections, its compliance reviews, its enforcement cases, and its crash records. In addition, FMCSA worked with the Volpe National Transportation Systems Center to develop a methodology, SafeStat (Safety Status Measurement System), to evaluate and rank carriers based on their performance if four

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key areas: vehicle, driver, crash rate, and safety management. In December 1999, the FMCSA launched the availability of individual carrier safety performance data on its Analysis and Information online system. Prior to these developments, much of the safety was dis-aggregated at both the federal and state levels. Individual states kept their own crash records and did not share them with the federal government. However, even with vast improvements in collection and organization of data, there are still gaps, stemming primarily from the collection of certain data (primarily truck crash reports) and uploading of individual state data to MCMIS.

Strategic Importance

Enhancing the safety performance data information system is a strategic issue for the FMCSA. There is a definite need to move the system to one that reflects real-time safety performance of individual carriers. There is a strong belief that a very effective way to achieve improved safety performance is to disseminate SafeStat's carrier evaluations, based on real-time data, over the Internet. With this powerful data base, carriers will have strong incentive to improve their safety performance since shippers will have the ability to factor-in safety performance as a carrier selection component in a much more direct and significant way. Real-time safety performance data will also be a powerful tool for insurance companies in determining premiums and in facilitating carrier adoption of safety performance-enhancing programs and policies.

Consequences if not Addressed

If the FMCSA does not initiate actions to enhance a move to a real-time safety performance evaluation database, then some of the anticipated benefits of the current

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system will not be achieved. Clearly, the current system is achieving many of its objectives and is a significant improvement over the fragmented data from the past. However, its full potential as a mechanism to improve safety performance would be enhanced if the data collection system were improved to insure complete data collection and uploading of information in real or near real time. FMCSA has a series of policy choices to consider in achieving this goal. There is great variation among the states in their participation in current efforts. FMCSA action must consider implementation of a real-time system as a combination of additional resources and new policies.

9. What are the most effective ways to facilitate changes in highway design or operating practices to reduce commercial vehicle crashes?

Issue Statement

Federal responsibility for highway infrastructure resides in the Federal Highway Administration (FHWA). The responsibility of the FMCSA to promote and ensure motor carrier safety includes the need to understand how heavy vehicle design and operations interact with those of the highway infrastructure from a safety or crash risk perspective. For example, large trucks accumulate a large portion of their vehicle miles traveled (VMT) on Interstate and other divided highways, but are relatively under-involved in crashes while on these highways. Forty percent of all large truck miles are driven on Interstate highways, but only twenty-four percent of large truck-involved fatal crashes occur on those roadways. In contrast, nearly three-fifths of large truck fatal crashes occur on undivided highways. The question of relevance to the FMCSA is whether or not there are opportunities to control the use of this nation's highway capacity to shift an even

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greater share of total truck miles to divided as opposed to undivided roads.

Strategic Importance

This is a significant strategic issue for the FMCSA. Studies show that converting two-lane sections of roadway to four-lane divided highways would reduce all crashes per highway mile by about half. The study did not specifically address large truck crashes, but presumably a similar result would be found for this crash sub-population. Clearly, by removing large truck traffic from two lane roads and shifting it to divided highways, major reductions in truck crashes are feasible.

Consequences if not Addressed

Failure to alter current patterns of truck traffic will result in continuing over-representation of truck crashes on undivided highways. There are opportunities for intervention with significant potential payoffs in terms of reduced crashes. Options for action range from programs to upgrade existing individual facilities to divided facilities to programs that encourage re-routing of truck traffic away from high accident roads. There could be an evaluation of the extent to which any actions beyond encouragement would be feasible as well.

10. What can be done to address the issue of driver shortages?

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The supply of drivers will be critical to meeting the anticipated growth in motor carrier shipments resulting from anticipated surges in economic growth. The supply of drivers, in fact, has not kept pace with the current pace of economic expansion, let alone keeping pace with anticipated growth. It is estimated that, at present, some five to ten percent of the fleet of truckload carriers sits idle as a consequence of driver shortages.

Strategic Importance

The driver shortage problem is a strategic issue of the FMCSA. Driver shortages, coupled with inadequate compensation, yield significant increases in driver work hours (including both driving time and time in loading/unloading as well as waiting time to load and unload). Research at the University of Michigan indicates that drivers work more than the legal limits and that their work hours are increasing.

Failure to Address

The failure to address this issue will result in increasing pressures on existing drivers to extend their workweek. To the extent that driver shortages will exacerbate the problem of extending the workweek, they will contribute in a direct way to driver fatigue. We know that driver fatigue/driver inattention is an important contributor to crash causes. Although the exact percentage of crashes in which fatigue played an important direct contribution is not known precisely, it is believed to be significant.

What are possible courses of action open to FMCSA? In addition to adopting new rules for hours-of-service, improvements could be made in the on-vehicle monitoring of driver service hours. Second, FMCSA could examine direct labor supply opportunities

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through adjustments in the age at which drivers are eligible to obtain a CDL. These experiments have already been initiated in last year's pilot project for the licensing of younger drivers for smaller-sized commercial vehicles. These could provide additional drivers to the pool, but it raises fundamental questions about the need to monitor and track to safety performance of new drivers in much the same ways as someone might monitor the safety performance of new carriers.

It is important to note that the question of driver shortages and driver compensation is closely linked. With higher levels of compensation, more drivers would be willing to enter this occupation. This additional influx of supply would help alleviate the current shortage.

11. What can be done to reduce the practice of truck drivers operating vehicles while fatigued?

Issue Statement

There is evidence that truck driver hours of work are extremely long. On average, drivers work more than the legal limits. Drivers have been under more demanding schedules as a consequence of the increasing emphasis on just-in-time deliveries combined with streamlined supply chains. Loading and unloading have also become problems in the current environment since drivers are required to load and unload for little or no pay. On average, drivers spend 25 percent of their workweek on non-driving labor and at least half receive no pay for this activity. These factors, along with severe wage pressures due to the emphasis on transportation cost reductions, combine to increase driver fatigue.

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Strategic Importance

The problem of increasing driver fatigue is a strategic issue for the FMCSA. Fatigue related factors have been identified as contributing to a crash in the Fatal Accident Reporting System (FARS). A review of driver related factors identified as contributing to fatal crashes includes the following factors: driver inattention (4.4 percent of the crashes); driver drowsiness, sleepiness, fatigue (1.8 percent of the crashes); and driver running off the road or out of a traffic lane (10.9 percent of the crashes). Thus, in over 17 percent of fatal crashes, fatigue-related factors contributed to the occurrence of the fatal crash. There have been other estimates that fatigue factors contributed to a much higher percentage of total crashes. Putting aside differences about frequency, there is no question that driver fatigue/inattention are important factors.

Consequences if not Addressed

Without any change, the problem of fatigue-related crashes will intensify. Many of the cases of vehicles running off the road or out of traffic lanes or involving a single vehicle crash are related to driver fatigue. By reducing the number of fatigued drivers, there will be a corresponding reduction in crashes.

The challenge is developing a response to the fatigued driver problem. There are possible technological solutions involving the monitoring of driver service hours through on-board sensors and transponders or devices on drivers that will alert dispatchers or disable vehicles if signs of fatigue emerge. Implementation of these applications might require new regulations. Alternative policy actions would involve addressing the underlying contributors to low wages and unpaid hours for loading and unloading.

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12. What can be done to facilitate carrier adoption of sound vehicle maintenance and replacement policies?

Issue Statement

There are significant variations among the nation's largest motor carriers in the amount of outside maintenance expenses per tractor/truck in their fleets. The average per tractor/truck expenses are less than \$2,500 for the General Freight (LTL) carriers who are likely to have in-house vehicle mechanics. At the other end of the spectrum, Heavy Equipment carriers average over \$10,000 on per vehicle outside maintenance expenses. However, these data don't provide a basis for comparing the vehicle maintenance policies of the two carrier groups. There is no control for the mix of in-house and contracted vehicle maintenance personnel. Furthermore, there is no control for fleet age, which makes a big difference in the amount and type of repair needed.

Strategic Importance

Adequate vehicle maintenance and a set of policies and programs to maintain vehicle condition and to replace vehicles on a regular schedule is a critical component of any effort to reduce crashes. The Fatal Accident Reporting System database indicates that in about 8 percent of the crashes, vehicle-related factors were involved. Many contend that these percentages understate the contribution of vehicle problems to crash occurrence. Nonetheless, even the eight percent figure, with an understatement factor, is

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significant.

Consequences if not Addressed

Failure to address this issue will have negative implications since there will be lost opportunities to reduce crashes in which vehicle-related factors contributed to the occurrence of the crash. There is a range of potential intervention points for FMCSA. First, there are potential technology solution wherein vehicles would be equipped with on-board diagnostics for major operating system components. Information about these systems would be displayed on the instrument panel in much the same way as information about airplane system components are displayed to pilots on the dashboard. FMCSA could work to get tax incentives to encourage carriers to buy new vehicles with such systems or to retrofit existing equipment. FMCSA oversight on maintenance effort by carriers might be an option as well. Getting additional information on best practices in maintenance programs and policies would be critical in the effort to establish action guidelines.

13. What can be done to improve the operation of the CDL Program?

Issue Statement

The FMCSA's responsibilities relating to commercial driver safety include the establishment and enforcement of licensing standards for interstate commercial drivers (the Commercial Drivers License (CDL) Program) and the maintenance of safety records of commercial drivers (through the Commercial Drivers License Information System or

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CDLIS). There are many concerns about the implementation of these programs and their success in denying CDL's to unqualified drivers or those who have poor driving records in one state from getting a CDL in another state. Too frequently, the press reports that drivers involved in a serious truck crash had a long string of traffic offenses in multiple states that should have prevented the driver from obtaining a license.

Strategic Importance of Issue

The effective operation of the CDL program and its associated CDLIS is a strategically important issue for the FMCSA. Insuring that the pool of drivers operating large trucks is qualified and has not violated traffic regulations on a consistent basis is central to its core mission of improving truck safety and reducing crashes and fatalities. The landmark Indiana Tri-Level Study of crash causes (1979) and other major studies of crash causation, regardless of vehicle type, have confirmed that the vast majority of traffic crashes are principally related to human causes--either misbehaviors, inadvertent error, or impaired state, such as fatigue or alcohol intoxication.

Consequences if not Addressed

There are significant consequences associated with the failure to improve the CDL and the CDLIS. Both programs were designed to improve professionalism of the nation's truck drivers by systematically removing unqualified drivers and from preventing their return into the system through an uncoordinated system of licensing and registration. The CDL and the CDLIS were proposed as national systems that would centralize information so that an individual driver's record would follow him or her. The MCSIA mandated changes in the CDL and CDLIS. The FMCSA should view these changes as mission

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critical. There are a number of opportunities for improvement. First, under consideration is a learner's permit for commercial drivers as well as a graduated licensing procedure that would base addition driving privileges on good performance. Second, technology advancements (finger print identification) that would prevent fraudulent practices in obtaining driver licenses. Third, enhanced data systems to make sure that CDLIS include complete information on each driver's complete safety violation records. Specific programs and enhancements would depend upon assessments of the feasibility, implementation time, and costs.

14. What can be done to improve passenger car driver performance and their perception of risk in truck interactions?

Issue Statement

Frequently, car drivers are unaware of the substantial differences between the performance of trucks (i.e. sight lines, braking distances) and that of passenger cars. As a result, passenger car drivers will engage in maneuvers to which the truck driver does not have time to respond. Passenger car drivers will enter into the so-called truck driver “no-zone”—an area on either side of the truck driver’s vehicle that is outside of the viewing area of the rear-view mirrors. At other times, passenger car drivers will cut in front of a truck and not realize that the trucks have significantly longer stopping distances than do passenger cars.

A recent study by the University of Michigan Transportation Research Institute investigated driver-related crash factors in light of other data available on large truck fatal

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crashes (Blower, 1998). In one-half of the fatal crashes involving one large truck and one passenger vehicle, physical evidence about each vehicle's maneuver and position prior to the crash was available to help verify the coding of the driver-related factors. In these cases, the driver-related factors appeared to be consistent with the physical evidence. The drivers of vehicles that encroached into the other vehicle's lane in head-on and sideswipe crashes, and drivers of vehicles that struck the other vehicle in rear-end crashes, were assessed driver-related factors or errors more often than the other driver. In the majority of these cases, the passenger vehicle driver was attributed with driver-related factors more often than the driver of the large truck.

In 1996, the Michigan State Police began collecting crash data in a program called the Fatal Accident Complaint Team (FACT). By April 2000, data on 332 large truck fatal crashes had been collected. In the 332 crashes, the actions of the vehicle other than the large truck were the critical events that caused the crash in 59 percent of the cases. In another 28 percent, the action of the truck driver—including speed, loss of control, and failure to adjust to road conditions—was the critical event.

Strategic Importance

Large trucks share the roads with passenger cars. Throughout the US, few roads provide for separation of trucks from cars. Throughout the past decade, truck and passenger car vehicle miles have been increasing at a significant pace. There is no question that the additions to highway capacity have been totally inadequate to accommodate the increases in truck and car vehicle miles. The resulting congestion has a whole set of strategic policy issues. The one of relevance for this discussion is that increasing congestion means that there has been increasing interaction between cars and

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trucks. The congestion problem intensifies the opportunity for the misjudgments of passenger car drivers to result in crashes.

Consequences if not Addressed

There is an opportunity for reducing crashes if actions are taken to improve driver performance when encountering truck traffic and to increase their perception of the risks involved in these situations. There is a definite education opportunity. Greater knowledge by passenger car drivers of the challenges facing the truck driver in terms of stopping distances and sight lines would help in improving driver performance. There are great challenges, however, in devising a set of actions and programs to address this issue. It is also a daunting task to determine a linkage between those actions and programs and any resulting crash reduction.

15. What can be done to reduce over-representation of larger-sized combination vehicles in truck crashes?

Issue Statement

Large trucks in FARS, GES, and MCMIS are placed into three categories: single-unit or straight trucks or SUT, combination-unit trucks or CUT, or unknown large trucks. The most important differences between CUTs and SUTs in crashes are:

- Tractors pulling semi-trailers accounted for 62 percent of the trucks involved in fatal crashes in the five years from 1994 through 1998. These tractor semi-trailers

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accounted for 52 percent of the trucks involved in non-fatal crashes in MCMIS and 48 percent in GES. Both these non-fatal numbers probably would have been higher, if the unknown and missing data could be eliminated.

- The ratio of CUTs to SUTs in fatal crashes is more than 3 to 1. SUTs accounted for only 20 percent of the trucks involved in fatal crashes, 21 percent of the trucks involved in non-fatal crashes in MCMIS, and 13 percent in GES.
The differences between CUTs and SUTs are more apparent when examined on a per vehicle basis. Annually, 203 CUT's were involved in fatal crashes per 100,000 registered CUTs, compared to 23 SUTs involved in fatal crashes per 100,000 SUTs, a ratio of nine to one. For injury crashes the rates were 4,230 for CUTs compared to 1,046 SUTs per 100,000 registered vehicles, a ratio of four to one.
- For every 100 million miles traveled by a CUT, an average of 2.8 CUTs were involved in fatal crashes in 1994 to 1998, compared to 1.8 SUT's involved in fatal crashes per 100 million miles traveled. On the other hand, 44 CUTs were involved in injury crashes per 100 million miles traveled, compared to 56 SUTs per 100 million miles traveled.

Strategic Importance

Clearly, the nation's commerce depends upon the delivery of freight in large tractor-trailer combinations. The over-representation of CUTs in truck crashes and fatalities is a strategic concern to both the FMCSA and the National Highway Traffic Safety Administration. While there has been much discussion and debate about the safety consequences of increasing legal sizes and weights of CUTs, this data reveal an over-

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representation in crashes of CUTs versus SUTs, regardless of the size and weight of the CUTs. These data raise issues that are even more fundamental than the issues raised about increasing the geographic areas where triples are allowed to operate, as an example.

Consequences if not Addressed

Based on the data and distributions cited above, failure to intervene in this situation will result in a continuing over-representation of CUTs in the population of truck crashes. There should be a note of caution in this discussion concerning the interpretation of the data discussed above. Looking at a distribution of crashes and noting that CUTs are over-represented in no way controls for the differences in VMT between the CUTs and the SUTs. With CUTs, in general, accumulating many more annual miles than do SUTs, then perhaps some of the differences in crash frequencies by the CUTs may be explained by an exposure variable. Thus, the first requirement is that there be some attention in providing an overriding explanation for the observed differences. To the extent that differences in vehicle miles traveled per vehicle explains the differences in crashes, then the policy recommendations may be entirely different. However, to the extent, that the CUTs have systematic problems that result in higher crash rates than the SUTs, then there may be a basis for program or policy actions. It seems appropriate, nevertheless, to spend time investigating the underlying phenomena prior to a launch of a series of actions or programs.

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